

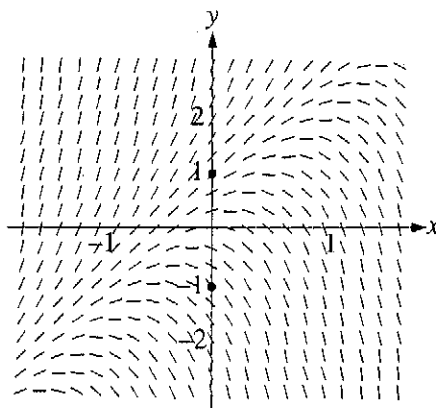
Topic 4
BC only

2002 AP[®] CALCULUS BC FREE-RESPONSE QUESTIONS

5. Consider the differential equation $\frac{dy}{dx} = 2y - 4x$.

- (a) The slope field for the given differential equation is provided. Sketch the solution curve that passes through the point $(0, 1)$ and sketch the solution curve that passes through the point $(0, -1)$.

(Note: Use the slope field provided in the pink test booklet.)



- (b) Let f be the function that satisfies the given differential equation with the initial condition $f(0) = 1$. Use Euler's method, starting at $x = 0$ with a step size of 0.1, to approximate $f(0.2)$. Show the work that leads to your answer.
- (c) Find the value of b for which $y = 2x + b$ is a solution to the given differential equation. Justify your answer.
- (d) Let g be the function that satisfies the given differential equation with the initial condition $g(0) = 0$. Does the graph of g have a local extremum at the point $(0, 0)$? If so, is the point a local maximum or a local minimum? Justify your answer.

2007 AP[®] CALCULUS BC FREE-RESPONSE QUESTIONS

**CALCULUS BC
SECTION II, Part B**

Time—45 minutes

Number of problems—3

No calculator is allowed for these problems.

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4. Let f be the function defined for $x > 0$, with $f(e) = 2$ and f' , the first derivative of f , given by $f'(x) = x^2 \ln x$.
- (a) Write an equation for the line tangent to the graph of f at the point $(e, 2)$.
 - (b) Is the graph of f concave up or concave down on the interval $1 < x < 3$? Give a reason for your answer.
 - (c) Use antidifferentiation to find $f(x)$.
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2008 AP[®] CALCULUS BC FREE-RESPONSE QUESTIONS

5. The derivative of a function f is given by $f'(x) = (x - 3)e^x$ for $x > 0$, and $f(1) = 7$.
- (a) The function f has a critical point at $x = 3$. At this point, does f have a relative minimum, a relative maximum, or neither? Justify your answer.
 - (b) On what intervals, if any, is the graph of f both decreasing and concave up? Explain your reasoning.
 - (c) Find the value of $f(3)$.
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WRITE ALL WORK IN THE PINK EXAM BOOKLET.